

NIBE ELEMENT RAILWAY SOLUTIONS



NIBE ELEMENT RAILWAY SOLUTIONS
SAFETY • ENERGY EFFICIENCY • COMFORT

ELEMENT: EVERY DAY, EVERYWHERE



NORTH AMERICA

EUROPE

ASIA/OCEANIA

NIBE ELEMENT BUSINESS AREA

NIBE ELEMENT develops, produces and sells customized solutions and components for electric heating, measurement and control. With beginnings in stainless steel tubular elements, the company has grown steadily through organic expansion and acquisitions, enabling integration of many new innovative technologies. Today the group offers a versatile product range, with a wide number of technologies for several industries and a large variety of applications.

- 6000 employees in some 40 production units on 4 continents
- Strong focus on components and systems for sustainable energy solutions
- 60 years of accumulated competence and experience in industry
- International organization with local presence
- Many specialized R&D departments to bring new innovative solutions to the market
- Customized solutions fulfilling special requirements
- Volume and industry production throughout the world

TECHNOLOGIES



Tubular Heating Elements



Printed Elements



Supported wire Elements



Measurement & Control



PTC Elements



IR & Halogen Elements



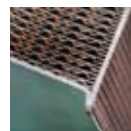
Heating Cables



Suspended Wire Elements



Heat Pump Technology



Special

INDUSTRY SECTORS



Industrial/Projects



Energy/Environment



Advanced technology



Commercial equipment



Home appliance



Transportation



HVAC



COMPONENTS AND TECHNOLOGIES FOR RAILWAYS

NIBE ELEMENT RAILWAY SOLUTIONS is a cooperation of companies within NIBE ELEMENT that provides components and technology for railways.

At NIBE, we believe that our combination of global representation and individual, local manufacturers brings us closer to our customers. We manufacture products that contribute to more efficient use of energy and reduced carbon dioxide emissions. Energy, climate and sustainable development are high on the agenda for us, and we continually work to improve our existing product range and develop new, innovative products and solutions.

EASY ACCESS TO THE BEST SOLUTIONS

NIBE ELEMENT RAILWAY SOLUTIONS makes it easy for our potential customers, existing customers, and partners to obtain high-quality solutions for a wide range of heating-related railway applications.

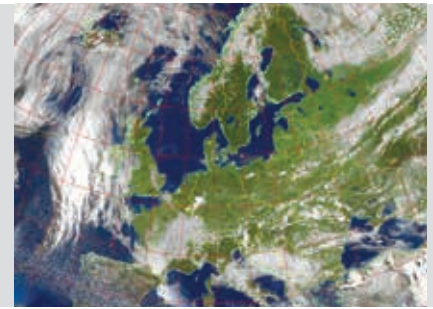
Our solutions cover both infrastructure and rolling stock. We supply components as well as complete intelligent systems and software.

NIBE ELEMENT RAILWAY SOLUTIONS is your single point of contact and technology inspiration.



- Development, design and production of complete switch point heating systems, contact rail and contact wire de-icing solutions
- Manufacturing of tubular elements and flexible foil heaters
- Customized power resistors for use in power electronic equipment
- Customer-specific heating solutions, including cabin- and toilet heating
- Flow-through boilers and steam generators.





INTELLIGENT HEATING SOLUTIONS

Energy-saving heating systems to ensure reliable railway traffic through switch points in severe winter weather conditions - Reduced life-cycle cost through dedicated, quality solutions for all types of lines: high speed - intercity - heavy cargo - urban city - branch lines - industrial sites - tram - light rail

Gain 40% to 80% energy savings using electronic weather forecasts. Our weather-mode based control system is designed to receive a local and very short-term weather forecast and prepare switch points in case snow or white frost is predicted. This way, energy flow takes place only when necessary.

System component deliveries from the smallest rail clips, heating elements and control cubicles to complete systems including monitoring and control software systems (SCADA).

Control Cubicles

Intelligent heat control – from manual to fully automated systems, including rail temperature feedback of heated and cold rail, weather station for snow, wind and air temperature, and online reception of the latest weather forecast online. Wide range of fault detection systems and multiple fail-safe modes to ensure traffic reliability.

System available in stand-alone or master-slave configuration.
Wired or wireless communication to the supervision system.

Safety Transformers

Isolation of installation (class II) from mains and separate left/right track installation. Transformers placed inside the control cubicle or as track-side mounted transformers.

3-phase input for full load balancing between phases.



Snow Detectors

The heart of weather feedback. Maintenance-free, gold-plated heated sensors, ready for the rail environment. Single open snow detectors or advanced dual detectors for both drifting and very light snowfall. Options available for built-in air temperature sensors.

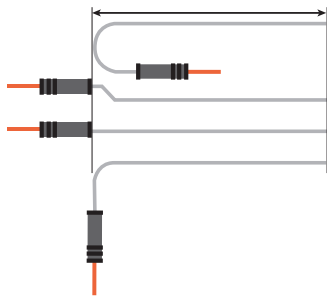




LONG-LIFE POINT HEATING ELEMENTS

15–20 Years Lifetime – Reliability is crucial for the lifecycle cost of point heating systems

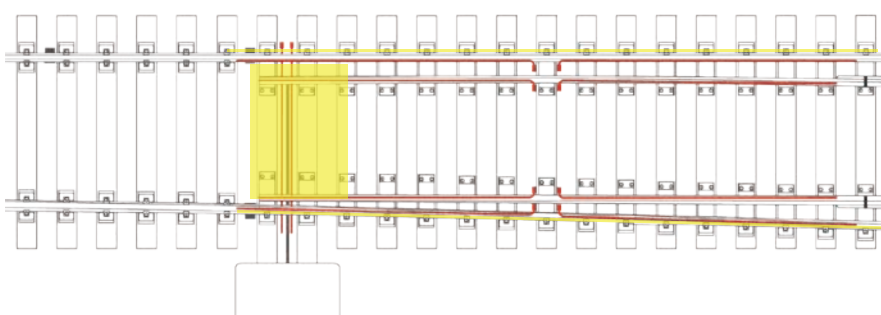
No point heating system is better than its heating elements! Changing damaged heating elements during winter conditions is very expensive, requiring extra safety staff, transport, service closing of tracks and a new element. Add to this the risk for penalties for traffic disruption. The price difference for low-quality elements is then no longer attractive. NIBE offers high-quality elements with a proven railway lifetime of 15–20 years.



Crip heating and flexible slimline heating for hydraulic point machines.

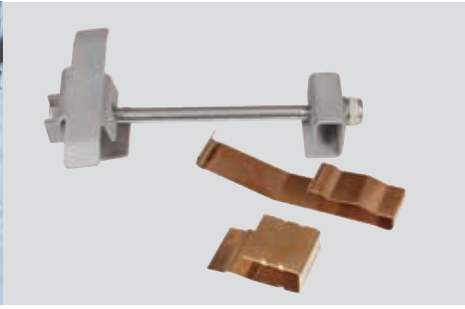


- Flat oval profile. Slim line 11x5.5mm or standard 13x5.5mm
- Power range from 100 to 1200W per meter
- Supply voltage from 45 to 800V AC/DC
- Pre-bent in standard shapes or individual customer shapes
- Models with detachable cable termination
- Models made with special steel grade to resist de-icing salty conditions (Embedded street switch points)
- Product approval from most 'cold' European national railways, including DB



Typical full mounted switch point

- Inside or outside the stock rail
- Pointer rail
- Crip heater
- Insulation of stock rail



EFFICIENCY-IMPROVING INSTALLATIONS

Insulated stock rail

Typically 20–30% reduction of energy or increased efficiency of switch point heating through insulation of the outer side of the stock rail. Easy-to-mount solution.

Clips and fixation brackets

NIBE provides a large range of different clips and brackets to mount heating elements on different rail profiles, stock or pointer rail, and different ways to secure the elements. All our solutions are designed to correct surface pressure and allow for the unavoidable linear expansion of the heated element.

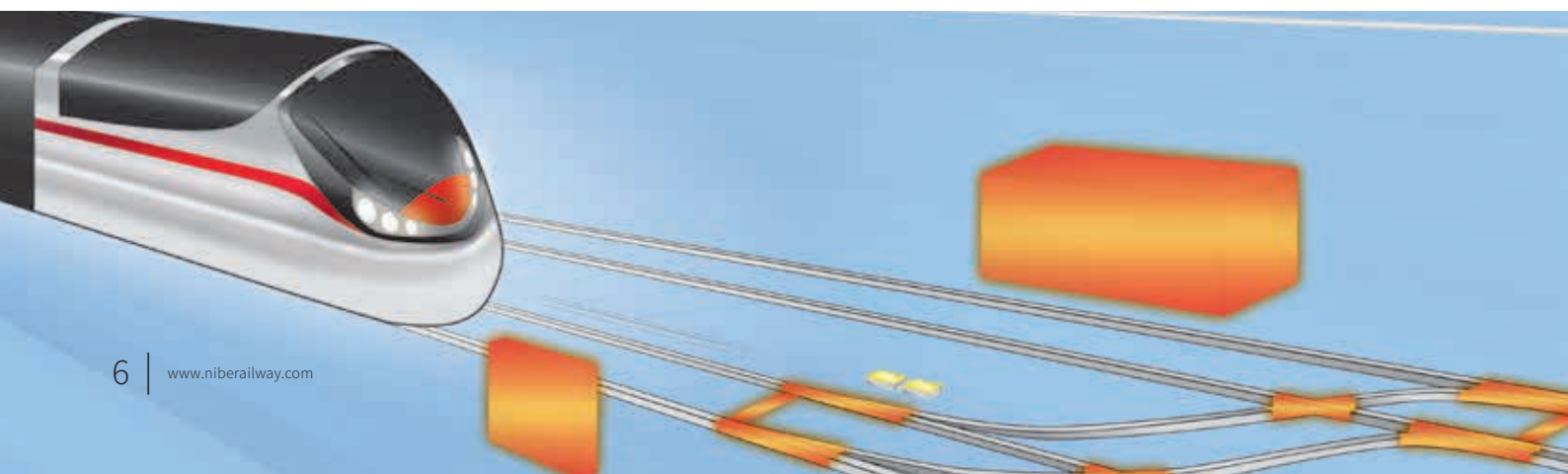
Infrared image showing an insulated switch point with heating elements on both the stock rail and switch rail.

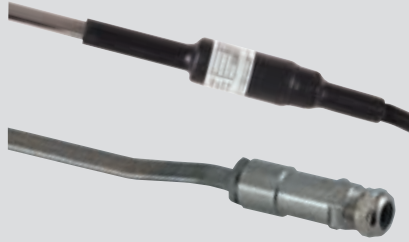
Temperature sensors

Correct rail temperature feedback is essential for an efficient point heating system. NIBE offers high-quality temperature sensors made specially for the railway environment, including housing for different locations of the sensor. Our latest development is an ultra-magnetic temperature sensor for rail bottom mounting – saves time on installation.

Load resistor test system

For diesel electrical trains. Save expensive time and energy on test runs of diesel locomotives after service. This complete generator performance test system measures and documents electro performance, ignition pressure, exhaust temperature, oil temperature and more.





STAND-ALONE OR COMPLETE CITY SYSTEM

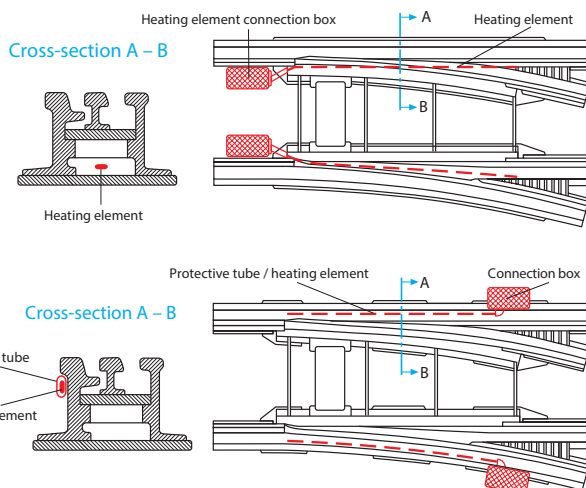
Efficient, long-life heating elements and 40-70% energy savings

Avoid point heating burning 6-7 months a year... Many days are cold, but without ice and snow. NIBE controls energy so heating takes place only when needed. It's a complete, multi-mode weather dependent system!

The weather forecast for the whole city is analysed. If snow is predicted, all relevant controllers get the message to heat.

Information about errors and other conditions from each controller is communicated back to the system.

Control cubicle for 1 to 16 switch points, separate weather stations and monitoring & control software (cloud solution also available).



Point heating element

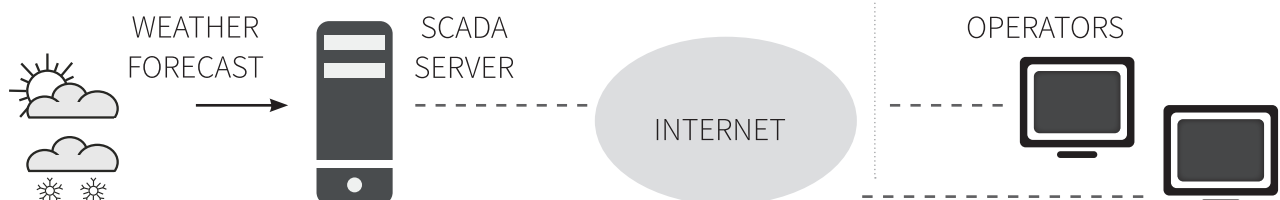
Specially designed for the extreme conditions of city roads in winter. Materials are selected specifically for the hot-moisture, heavy-salt conditions in which normal heating elements fail.

Tramline point heating is challenging...
not only to melt falling snow but also snow and ice from moving cars, and as shown here, from rail snow ploughs.



Typical imbedded Boxes

For access to the heating strip for point heating. The heater is placed in a protective tube welded to the tramline channel rail.



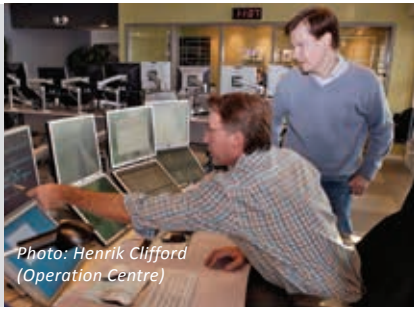


Photo: Henrik Clifford
(Operation Centre)



VALUABLE INFORMATION ON-LINE

SCADA

Supervision Control & Monitoring Software

Unify all point heaters or overhead wire heating in a territory. Easily access valuable information for traffic control, maintenance and technical departments.

Scalable, ready-to-use software package to build heating solutions for energy- and maintenance-efficient systems at controlled cost. Communication between control cubicles and SCADA can be wired Ethernet, fibre-optic cable or wireless GPRS/GSM/G/3G.

- Complete system overview
- Instant messages upon critical failures
- Individual control settings down to every installation/station
- Energy management; counters and statistics
- Urgent calls for maintenance
- Monitoring of local weather conditions
- Distribution of local weather forecasts to every control cubicle
- Commands for individual switches or sections to heat
- Errors or other malfunctions online
- Centralized updates of cubicle software
- Security; multi-level user access
- Information sharing with other SCADA systems
- Cloud solution available

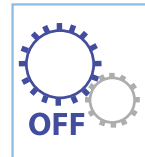
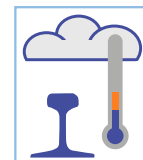
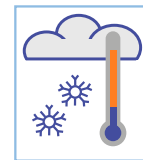
Reduce IT investments with Hosted SCADA

Some systems are also available as a cloud solution. No need for expensive IT hardware and maintenance. All users have easy Internet access to the application. Data transfer to and from the installation via secure wireless communication.

The Hosted SCADA solution is designed specifically for smaller railway companies, medium-sized city tramlines, and single large installations such as one station, a tunnel or a bridge, but also for test installations before full implementation.

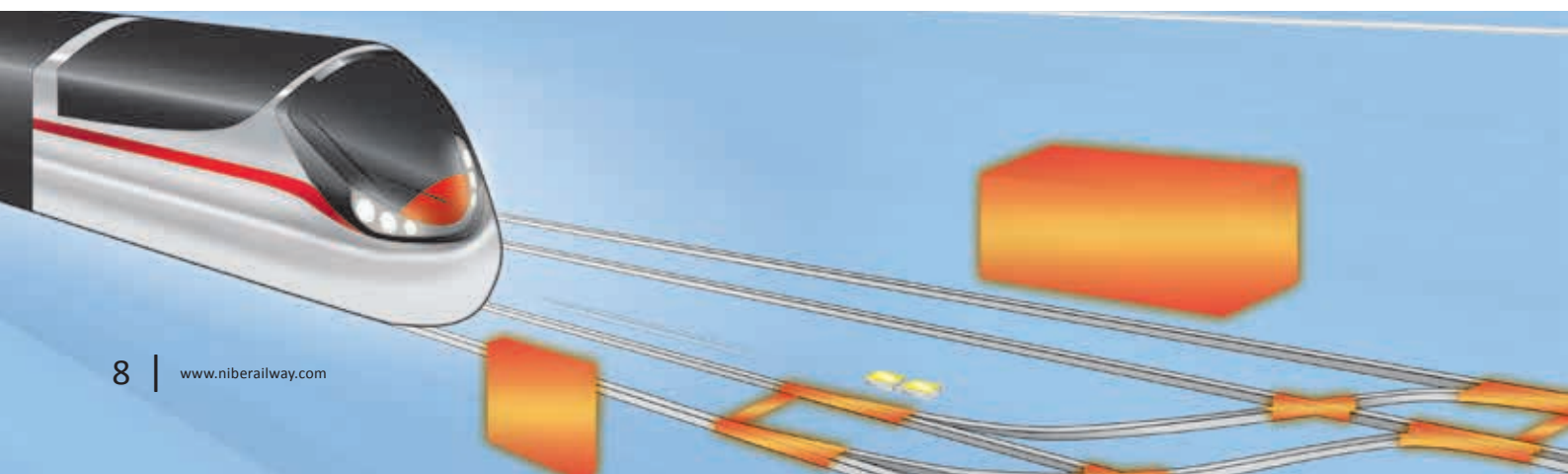
Easy Overview

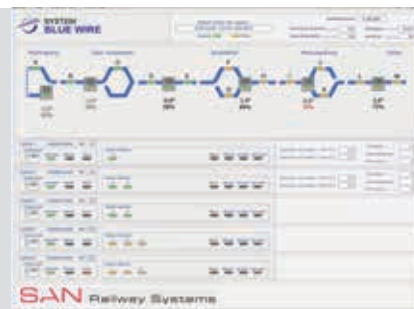
Use of consistent icons and graphics makes it very easy to 'read' a complete installation. Drill down from the overview to detailed online information or historical data.



Icons for fast status view

Special icons indicate different modes for every controller in the area. Ensures fast reading of a complete territory regarding weather and controlling status.





ELIMINATE COSTLY TRAFFIC DISRUPTIONS

Contact Wire Heating

Permanent solution to de-ice the overhead contact wire in critical areas like uphill lines, tunnel entrances, bridges and yards. The heating system is powered from the overhead wire.

Heating

Consists of an insulated, constant-wattage heater enclosed in heat transfer material. The heating cable's triangular profile makes for easy mounting and excellent heat transfer.

Remote Control

Control cubicles to switch on/off heating when needed based on weather conditions and the weather forecast. Supervision system to control multiple lines or regions.

Eliminate costly disruptions of revenue service due to ice and frost accumulation on the contact wire or contact rail

Ice on the contact wire/rail causes tramlines and light rails to lose power. In extreme cases these conditions can bring down contact wire/catenary systems. Arcing caused by the presence of ice leads to excessive wear on pantograph conductors or pickup shoes, resulting in traffic delays and service disruption.

NIBE ELEMENT RAILWAY SOLUTIONS offers the BLUE WIRE system for heating overhead wires and the BLUE RAIL system to prevent accumulation of ice on contact rail.

Ice-free high-voltage lines!

Overhead wire de-icing for 15-kV or 25-kV OHL? A full-scale test system is now in its second winter of operation on a national railway in Europe.





IMPROVE SAFETY - PREVENT DAMAGE

NIBE ELEMENT RAILWAY SOLUTIONS offers engineering and manufacturing of steel grid resistors for railway applications, such as traction brake resistors, (de)-charging resistors, damping and filter resistors, crowbar resistors and line-test resistors. We analyse the project, the space requirements and the positions of the resistors, and tailor the solution precisely to our customer's needs.

Our steel grid resistors comply with leading international directives for traction, to meet stringent requirements for power resistor design, insulation, shock and vibration resistance and environmental conditions. NIBE ELEMENT RAILWAY SOLUTIONS is happy to perform routine testing in house. Special type tests can be performed at a certified testing institute close to the production facilities.



(De)-charging resistors

- Limit inrush current
- Prevent damage to other electrical components
- Improve safety

Damping and filtering

- Prevent damage to other electrical components
- Improve energy quality

Crowbar resistors

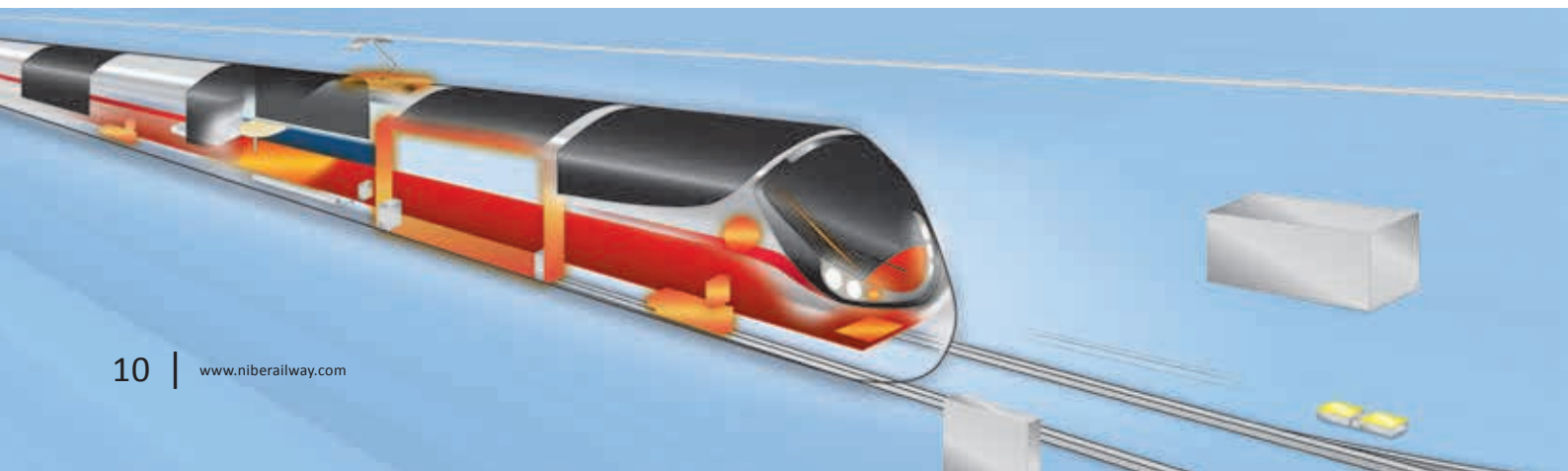
- Prevent damage to other electrical components

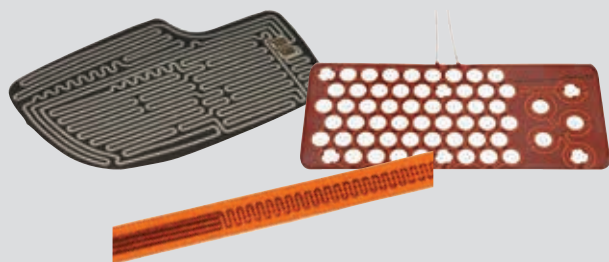
Line-test resistors

- Test overhead lines for fault conditions
- Clear moisture from overhead line insulators

Traction brake resistors

- Safe braking of trains
- No wear
- Very little maintenance





INTELLIGENT HEATING – WHEREVER IT'S NEEDED

Flexible foil elements

We've supplied the railway industry with our flexible foil for decades, and they are approved for high-tech, weight-management applications. These elements save space and are efficient alternatives for using comfort heating as floor heating, frost protection, rear-view mirror heating and seat heaters.

Our flexible foil is available in various materials, such as PVC, polyester, silicon and mica.

Couplers

It is important to heat the couplers to prevent icing and freezing during winter conditions.

Hydraulic oil and grease must be smooth. We offer technical heating solutions featuring flexible foils and cartridge heaters.



Lens heaters

Flexible foils installed for preventing ice and condensation on night cameras and spotlights.

Windscreen wiper heaters

Flexible foils assembled directly in the wiper and in stand-by position for efficient prevention of wiper icing and freezing – an application with a clear safety advantage.

Floor heating

With our electric radiant-heated floor solutions, you save space and weight by installing foil for floor heating.

Power output from 160–535 W/m² and supply voltage 120–600 V AC.

Doors

A range of efficient products such as flexible foil heaters, heating cables and other special solutions that guarantee easy installation and less maintenance.

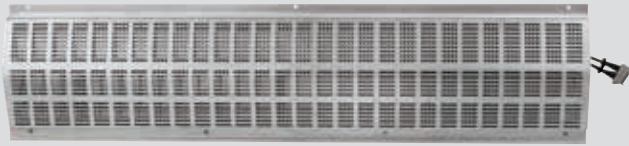


Steps

We offer a range of customized special solutions for easy installation on steps and disabled ramps.

Our range of flexible foils for defrosting and hydraulic oil heating is excellent for saving space and weight.





LOW MAINTENANCE AND LOW LIFE CYCLE COST

Body side heaters can provide additional passenger comfort and support the general heating system to create a better passenger environment. The heaters never exceed 60 °C and are designed with an extra security layer to increase passenger safety and prevent vandalism.

Advantages:

- Proven technology
- Low maintenance (Life Cycle Cost)
- All products made in stainless steel
- Easy access for ergonomic cleaning
- Durable

Technical specifications:

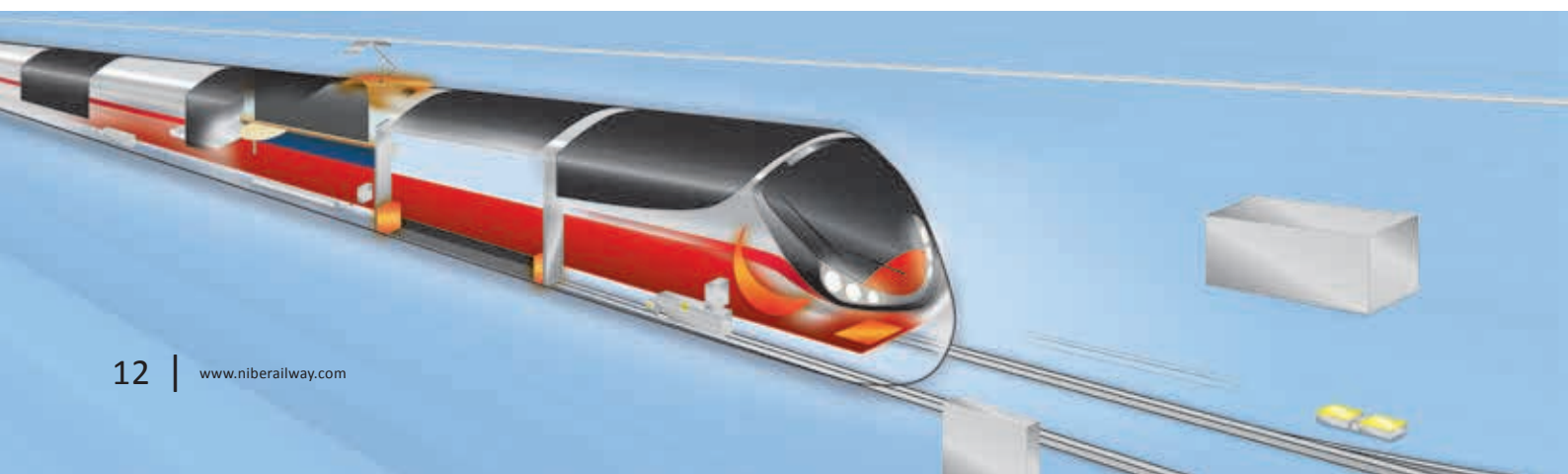
- Material EN 1.4301 / AISI 304 or customized
- Surface temperature max 60 °C and 100 % working ratio
- Electrical double- or single-insulated
- Comply with IPX4, EN 50155, EN-IEC 60068, EN 61000, EN 61373
- Power 500–1500 W
- Low weight solutions (5–12 kg)
- Voltage 230 V/50 Hz

Convection aluminium heater

Includes a thermostat and a temperature limiter. To be assembled inside the car body.



Radiant body side heater in aluminium





COMPACT EFFICIENT HEATERS FOR NARROW SPACES

Fan heaters provide additional passenger comfort and support the general heating system, and create a better environment for train personnel. The fan heaters never exceed 60 °C and are designed with an extra security layer to increase passenger safety and prevent vandalism.

Advantages:

- Proven technology
- Low maintenance (Life Cycle Cost)
- All products made in stainless steel
- Low noise
- Easy access for ergonomic cleaning
- Durable

Technical specifications:

- Material EN 1.4301 / AISI 304 or customized
- Surface temperature max 60 °C and 100 % working ratio
- Electrical double- or single-insulated
- Comply with IPX4, EN 50155, EN-IEC 60068, EN 61000, EN 61373
- Power 500–1500 W
- Low weight solutions (5–12 kg)
- Voltage 230 V/50 Hz



Driver's cabin

The Group offers a wide range of products such as floor heating, seat heating and air conditioning with temperature control to provide the best possible environment for the driver.

For additional comfort we offer appliances such as refrigerators and hot plates, tested according to standard EN 60335-1.



DESIGNED FOR ROOMS WITH HIGH HUMIDITY

Toilet Heaters that provide additional passenger comfort and support the general heating system. The heaters offer an improved ambience in the toilet. The heaters never exceed 60°C and are designed with extra security layer for passenger safety and vandalism.

Advantages:

- The toilet heaters require low maintenance (Life Cycle Cost)
- All products are made in stainless steel
- Easy access for ergonomic cleaning
- Compact design for narrow spaces

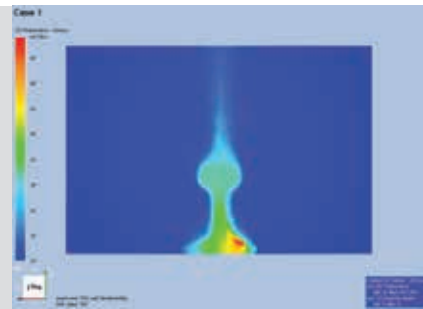
Technical Specifications:

- Material EN 1.4301 / AISI 304 or customized
- Surface temperature max 60°C and 100% working ratio
- Design: double or single insulated
- Comply with IPX4, EN 50155, BS6853, EN-IEC60068, EN61000, 61373
- Power 500-1500W
- Low weight solutions 5-12kg
- Voltage 230V/50Hz

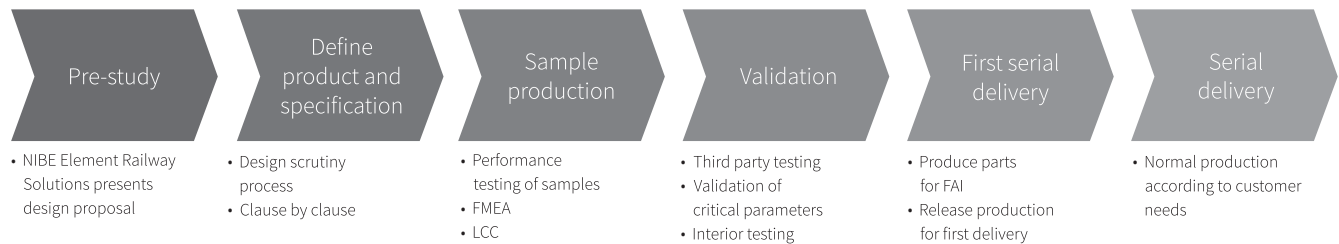
Highlights:

450W 230V 1ph. Horizontal or vertical installation. The heater can be supplied with more power and up to 480V 3ph.





PRODUCT DEVELOPMENT



PERFORMANCE TESTING

- Temperature and measurement
- Interior testing
- Thermal imaging
- Cooling room -25 °C
- Noise testing
- Humidity chamber
- Life-cycle testing
- Wind tunnel tests
- Resistor power testing
- Long-term corrosion tests
- Electrical tests up to 24 kV AC
- External resources for other types of tests such as shock and vibration and intermittent pulses

MASTERING THE DESIGN

- Pro/Engineer 3D-CAD
- X-ray equipment
- PDM-link / Product data management etc.
- FLO EFD
 - Thermal / flow simulations PTC MECHANICA
 - Thermal and stress analysis



QUALITY

We strive to deliver the highest-quality products combined with a flexible way of working. This permeates the whole process, from sales, product development and manufacturing to customer service and logistics. NIBE Element delivers products that meet all relevant standards and test requirements, and that can be certified according to customer specifications. We can also carry out tests in modern labs, and we constantly improve our product performance and energy efficiency.



INNOVATION FOR THE FUTURE

A partnership with NIBE Element gives you a dedicated team of designers, project engineers and technical experts in the fields of electric heating, measurement and control, ready to provide you with the optimal solutions for your needs.

NIBE
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RAILWAY SOLUTIONS

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